

REMARKS

Claim Amendments

Applicants presently cancel computer program product claims 8-13 and data processing system claims 14-20, leaving only method claims in the present application. In amending the claims in the present application, Applicants do not concede that the claims as originally filed were not in a condition for allowance nor do these cancellations represent a disclaimer of the recited subject matter. Rather, Applicants reserve the right to pursue these cancelled system and product claims in one or more continuation applications. Applicants believe themselves entitled to pursue these claims in additional applications because the system and product claims are directed to an invention in a different statutory category than are the method claims that remain in this application. Applicants believe they are entitled to have claims directed to inventions in separate statutory categories issued in separate patents.

Applicants amend claim 1 in the present application to include limitations previously recited in claims 2-6. Applicants submit that the amendments do not introduce new subject matter into the present application.

Claim Rejections – 35 U.S.C. § 103 over *Zwiegincew* and *Brady*

Claims 1, 3, 6, 8, 10, 13-15, 17, and 20 stand rejected under 35 U.S.C. § 103(a) as unpatentable over *Zwiegincew, et al.* (U.S. Patent 6,633,968) (hereafter “*Zwiegincew*”) in view of *Brady, et al.* (U.S. Patent 5,758,050) (hereafter “*Brady*”). As discussed above, claims 3, 6, 8, 10, 13-15, 17, and 20 are cancelled in this Response. The question of whether Applicants remaining claim is obvious or not is examined in light of: (1) the scope and content of the prior art; (2) the differences between the claimed invention and the prior art; (3) the level of ordinary skill in the art; and (4) any relevant secondary considerations, including commercial success, long felt but unsolved needs, and failure of others. *KSR Int’l Co. v. Teleflex Inc.*, No. 04-1350, slip op. at 2 (U.S. April 30, 2007). Although Applicants recognize that such an inquiry is an expansive and flexible one, the

Office Action must nevertheless demonstrate a prima facie case of obviousness to reject Applicants claim for obviousness under 35 U.S.C. § 103(a). *In re Khan*, 441 F.3d 977, 985-86 (Fed. Cir. 2006). To establish a prima facie case of obviousness, the proposed combination of Zwiegincew and Brady must teach or suggest all of Applicants' claim limitations. *Manual of Patent Examining Procedure* § 2142 (citing *In re Royka*, 490 F.2d 981, 985, 180 USPQ 580, 583 (CCPA 1974)). Independent claim 1 of the present application recites:

1. A method of loading data from disk in a data processing system, comprising:

comparing a current sequence of disk requests to data indicative of a previous sequence of disk requests, wherein the sequence of disk requests includes the sequence of disk requests following a power-on event;

responsive to detecting a match between the current sequence and the previous sequence, storing a copy of data blocks accessed during the current sequence in a contiguous portion of the disk, wherein storing a copy of data blocks accessed during the I/O sequence comprises storing the data blocks sequentially in the order that the data blocks were accessed chronologically; and

responsive to a subsequent request for data in the disk sequence, mapping the request to the sequential portion of the disk and servicing the request from data in the sequential portion;

wherein the contiguous portion of the disk to which the data is copied is on a different partition of the disk than a disk partition on which the original data is stored;

recording a sequence of disk accesses, wherein recording the sequence includes recording the disk address of each block accessed and the length of each block;

responsive to retrieving data from the contiguous portion, prefetching additional data from the contiguous portion of the disk and caching the additional data in a buffer; and

responsive to an I/O request, determining whether the data requested resides in the buffer and, if so, retrieving the data from the buffering without accessing the hard disk.

As shown below in more detail, the proposed combination of Zwiegincew and Brady cannot establish a prima facie case of obviousness against claim 1 because the proposed combination of Zwiegincew and Brady does not teach each and every element of claim 1 of the present application. The rejection of Applicants' claim should therefore be withdrawn and the claim should be allowed. Applicants respectfully traverse each rejection individually and request reconsideration of claim 1.

**Zwiegincew Neither Teaches Nor Suggests
The First Three Elements Of Claim 1**

The Office Action takes the position that Zwiegincew teaches the first three elements of claim 1 of the present application. The Office Action argued that "the claimed steps of comparing and detecting a match are inherent in the method taught by Zwiegincew because Zwiegincew discloses that the order in which the pages are accessed (i.e. the sequence of the disk requests) is determined based on the assumption that the disk access patterns are similar from run to run (i.e. at least one match in the sequence of disk requests is found and it is assumed that the same sequence will be called again in the next/future run) ..." The Office Action then cites Zwiegincew at column 2, lines 11-24, against the independent claim. Zwiegincew at column 2, lines 11-24, states:

Another prior solution involves strategically ordering pages in disk storage. According to this prior solution, the order in which pages will likely be accessed during typical usage of an application program is determined based on the assumption that disk access patterns are similar from run to run. Then, pages are stored in disk storage in the determined order. A strategic ordering of pages will result in a reduction of hard page fault times. However, this approach is somewhat limited by the fact pages may be accessed more than once by an application program. Therefore, additional hard page faults may occur when a particular page must be re-retrieved from disk storage. Strategically ordering pages in disk storage tends to work best when it is employed to reduce hard page faults in a single hard page fault scenario, typically boot.

That is, Zwiegincew discloses methods of reducing “hard page fault times,” which are random access memory faults. As disclosed in Zwiegincew – and as is well known in the art generally – a hard page fault or a random access memory fault is a failure to find memory in RAM. That is, a random access memory fault is not a disk access. A random access memory fault may be a cause of a disk access, but Zwiegincew’s discussion of ways of reducing hard page fault times for random access memory faults in no way discloses the inventive methods and products for loading data from disk in a data processing system as claimed here.

The discussion in Zwiegincew concerns patterns of hard page fault times rather than sequences of disk access. In fact, Zwiegincew at column 2, lines 11-24, emphatically teaches away from the use of patterns of disk access as claimed in the present application by asserting, “However, this approach is somewhat limited by the fact pages may be accessed more than once by an application program. Therefore, additional hard page faults may occur when a particular page must be re-retrieved from disk storage.” In fact, storing a copy of data blocks accessed during the current sequence in a contiguous portion of the disk as claimed in the present application will overcome the problem cited in Zwiegincew at column 2, lines 11-24, by assuring that all of the data blocks accessed during an access sequence are stored in sequence on the disk drive – *regardless whether they involve RAM pages accessed more than once.*

The term “sequence” occurs ten times in Zwiegincew, and each and every reference in Zwiegincew to the term “sequence” is in the context of a “hard page fault sequence.” There is not one word in Zwiegincew comparing sequences of disk accesses. To the extent that Zwiegincew is concerned with a “sequence” of any kind, Zwiegincew is totally and exclusively concerned with sequences of hard page faults – which does not disclose the use of disk access sequences as claimed here. More specifically, nothing in Zwiegincew discloses any comparison of a current sequence of disk requests to data indicative of a previous sequence of disk requests. Nothing in Zwiegincew discloses any detecting of a match between a current sequence and a previous sequence or storing a copy of data blocks accessed during the current sequence in a contiguous portion of the disk. And nothing in Zwiegincew discloses mapping of a subsequent request to the sequential portion of the disk as claimed here.

Zwiegincew at column 2, lines 11-24, discloses disk access patterns that are *assumed* to be similar from run to run in single hard page fault scenarios, such as, for example, a typical boot of an operating system in which it is sensible to *assume* that a number of disk sectors will be required in the same order time after time. Zwiegincew goes on to disclose that such assumed sequences of disk access are unreliable in typical applications because pages may be accessed more than once by an application program so that additional hard page faults may occur when a particular page must be retrieved from disk storage. That is, according to Zwiegincew, simply assuming the occurrence of a particular sequence of disk accesses will not reliably reduce hard memory faults in typical applications. Assuming for the purposes of argument that a sequence of page faults results in some particular sequence of memory accesses, the present invention solves this problem by determining as an actual fact in real time, not an assumption, that an application is presently actually using disk space in a particular sequence, identifying the sequence, and making the sequence contiguously accessible for faster access – none of which is disclosed in Zwiegincew.

Because the Office Action does not disclose the first three elements of claim 1, the Office Action cannot establish a prima facie case of obviousness. The rejections of claim 1 should therefore be withdrawn and the claim should be allowed.

**Brady Neither Teaches Nor Suggests Wherein The Contiguous Portion
Of The Disk To Which The Data Is Copied Is On A Different Partition
Of The Disk Than A Disk Partition On Which The Original Data Is Stored**

The Office Action takes the position that Brady at column 2, lines 28-37 discloses the following limitation of the fourth element of claim 1: wherein the contiguous portion of the disk to which the data is copied is on a different partition of the disk than a disk partition on which the original data is stored. Applicants respectfully note in response, however, that what Brady at column 2, lines 28-37, in fact discloses is:

The invention affords its users with a number of distinct advantages. First, the invention provides flexibility in data management, because the user can selectively store data in different storage partitions having different operating characteristics. The storage subsystem can therefore be optimized based on cost, performance, and availability of its components. Moreover, the user saves money by foregoing the purchase of different storage subsystems to implement different memory storage devices. With the present invention, a pool of data storage devices can be selectively apportioned to effectively provide different storage subsystems with different operating characteristics, e.g. RAID-5, LSA, non-RAID, etc.

That is, Brady discloses at the cited reference point that the user can selectively store data in different storage partitions having different operating characteristics. Brady's user that can selectively store data in different storage partitions having different operating characteristics does not disclose wherein the contiguous portion of the disk to which the data is copied is on a different partition of the disk than a disk partition on which the original data is stored, as claimed in the present application. Brady only discloses instances of data stored in different partitions without disclosing any copies at all. Brady does not disclose original data on a disk partition and copied data on a different partition as claimed in the present application. Without disclosing or suggesting the fourth element of claim 1, the Office Action cannot establish a prima facie case of obviousness. The rejections of claim 1 should be withdrawn and the claim should be allowed.

Claim Rejections – 35 U.S.C. § 103 over Desai, Burr, and Delhoune

In the Office Action, claims 1, 3, 6, 8, 10, 13-15, 17, and 20 stand rejected for obviousness under 35 U.S.C. § 103 as being unpatentable over Desai, et al. (U.S. Patent No. 6,789,171) (hereafter, 'Desai') in view of Burr, et al. (U.S. Publication No. 2004/0225874) (hereafter, 'Burr'), and further in view of Delhoune, et al. (U.S. Publication No. 2002/0196467) (hereafter, 'Delhoune'). As discussed above, claims 3, 6, 8, 10, 13-15, 17, and 20 are cancelled in this Response. The question of whether remaining claim 1 in the present application is obvious or not is examined in light of: (1) the scope and content of the prior art; (2) the differences between the claimed invention and the prior art; (3) the level of ordinary skill in the art; and (4) any relevant secondary considerations, including commercial success, long felt but unsolved needs, and failure of others. *KSR Int'l Co. v. Teleflex Inc.*, No. 04-1350, slip op. at 2 (U.S. April 30, 2007). Although Applicants recognize that such an inquiry is an expansive and flexible one, the Office Action must nevertheless demonstrate a prima facie case of obviousness to reject Applicants' claims for obviousness under 35 U.S.C. § 103(a). *In re Khan*, 441 F.3d 977, 985-86 (Fed. Cir. 2006). To establish a prima facie case of obviousness, the proposed combination of the references must teach or suggest all of Applicants' claim limitations. *Manual of Patent Examining Procedure* § 2142 (citing *In re Royka*, 490 F.2d 981, 985, 180 USPQ 580, 583 (CCPA 1974)). As discussed in more detail below, the cited combination of references does not teach or suggest each and every element and limitation of claim 1 of the present application. As such, the cited references cannot be used to establish a prima facie case of obviousness against claim 1 of the present application.

Burr Neither Discloses Nor Suggests Storing A Copy Of Data Blocks Accessed During The Current Sequence In A Contiguous Portion Of The Disk

The Office Action takes the position that Burr at paragraphs [0029] and [0030] discloses the following portion of the second element of claim 1: responsive to detecting a match between the current sequence and the previous sequence, storing a copy of data blocks

accessed during the current sequence. Applicants respectfully note in response, however, that what Burr at paragraphs [0029] and [0030], in fact discloses is:

[0029] With these concepts in mind embodiments of the invention can be further described with reference to FIG. 1A. At 100 BIOS instructions that are copied into DRAM during a first clean boot up process are copied into Boot Flash memory to allow all subsequent booting processes retrieve information from the Boot Flash memory, rather than the hard drive, which would reduce data access times.

[0030] Thus, if a PC requires a cold reboot due to internal data corruption or due to the PC passing through cold reboot after it was turned off, these successive reboot processes will utilize information stored in the Boot Flash rather than information stored on the hard drive of the PC, which as stated earlier reduces data access times.

That is, Burr at paragraphs [0029] and [0030] discloses BIOS instructions that are copied into DRAM during a first clean boot up process are copied into Boot Flash memory to allow all subsequent booting processes to retrieve information from the Boot Flash memory, rather than the hard drive, which would reduce data access times. Burr's BIOS instructions that are copied into DRAM during a first clean boot up process that are copied into Boot Flash memory to allow all subsequent booting processes retrieve information from the Boot Flash memory, rather than the hard drive, which would reduce data access times does not teach or suggest storing a copy of data blocks accessed during the current sequence as claimed in the present application because Burr does not teach or suggest storing a copy of data blocks accessed during the current sequence. Burr merely discloses saving *instructions* that were previously executed – not *data blocks that were accessed during the current sequence*. In fact, the present application sets forth an example in which a boot sequence may *invoke* a sequence of inefficient disk accesses. In such a case, Applicants' original specification discloses that data accessed during the disk access sequence is stored in sequential storage on a dedicated portion of the disk. *See*, Applicants' original specification at page 5, lines 4-19. That is, according to the claims of the present application and as described in Applicants' original specification, it is the blocks of data accessed during the current data access sequence that is stored – not a sequence of instructions as recited in Burr. Without teaching or suggesting that data

blocks accessed during the current sequence are stored, Burr does not teach or suggest the second element of claim 1 and the Office Action cannot establish a prima facie case of obviousness. The rejection of claim 1 should be withdrawn and the claim should be allowed.

**The Combination Of Desai, Burr, And Delhoune Does
Not Teach Or Suggest Wherein The Contiguous Portion
Of The Disk To Which The Data Is Copied Is On A
Different Partition Of The Disk Than A Disk
Partition On Which The Original Data Is Stored**

The Office Action admits at page 8 that Burr and Desai are silent as to whether data is stored in a contiguous portion of the disk. As such, Burr and Desai cannot possibly teach or suggest the following limitation of claim 1 in the present application: wherein the contiguous portion of the disk to which the data is copied is on a different partition of the disk than a disk partition on which the original data is stored. The Office Action attempts to cure the deficiencies of Burr and Desai by citing Delhoune at paragraph 0115.

Applicants respectfully note in response, however, that what Delhoune at paragraph 0115 actually discloses is:

[0115] When composing the image signal from the area tiles 12' of the different page elements 11', the image reproduction 10 is composed from top to bottom. Composition of the image signal is done by processing the different area tiles 12' as they are needed. A detailed system for composing the signal will be described later. In any case all the data of one area tile 12' have to be easily accessible. A particular advantage can be obtained when the data of an area tile 12' are stored in the memory 23 at contiguous locations such that retrieval of the data of an area tile 12' can be done very fast. When using a magnetic disk, the memory locations for storing complete area tiles 12' are preferably chosen as to make sure that the reading mechanism has to perform a minimum of mechanical movements so less time is consumed in reading data from disk. This can be done by storing the data in sectors where each sector comes directly after the previous. To obtain this storing of the data in contiguous memory locations, it is important to have optimum memory management. Fragmentation of the data is to be largely avoided. This gives an important advantage when the processing of the page elements 11' is to be done in real time i.e. while the printing engine 26 is running. Especially hard disk reading mechanisms are relatively slow and when data is stored at

unfavourable memory locations a large amount of time is consumed while waiting for the mechanical parts to move to places where the data is to be read from the memory 23, especially when data is scattered around at different locations of the disk. This threatens the continuance of the data stream to the printing engine 26. Also for other memory means 23 using different storing methods a good choice of memory locations for storing one area tile 12' can make a difference relating to the speed of retrieval of the area tile data 12'.

That is, Delhouné at paragraph 0115 teaches that an advantage can be obtained when the data of an area tile is stored in the memory at contiguous locations in memory.

Delhouné, at the cited reference point and all other reference point in Delhouné, however, does not teach or suggest wherein the contiguous portion of the disk to which the data is copied is on a different partition of the disk than a disk partition on which the original data is stored. Delhouné merely discloses that storing data in a contiguous location can be beneficial to the process of composing an image signal for image reproduction.

Delhouné does not teach or suggest, however, that Delhouné's contiguous memory location *is on a different partition of the disk than a disk partition on which the original data is stored* as claimed here. Delhouné is entirely void of any teaching even remotely related to this claim limitation. In fact, Delhouné only discloses instances of data stored in different partitions without teaching that copies of such data are stored elsewhere. As such, Delhouné does not disclose original data on a disk partition and copied data *on a different partition of the disk than the disk partition on which the original data is stored*. The cited combination of references therefore does not teach or suggest each and every element of Applicants' claims. Because the cited combination of Desai, Burr, and Delhouné does not teach or suggest each and every element and limitation of Applicants' claims, the cited combination of Desai, Burr, and Delhouné cannot be used to establish a prima facie case of obviousness against Applicants' claims. The rejections under 35 U.S.C. § 103 should be withdrawn and the claims should be allowed.

**The Office Action Does Not Examine
Applicants' Claims Pursuant To *Graham***

In addition to the fact that the Office Action has not established a prima facie of obviousness there is another reason that the rejection of claim 1 should be withdrawn:

The Office Action does not examine Applicants' claims in light of the factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966). The question of whether Applicants' claims are obvious or not is examined in light of: (1) the scope and content of the prior art; (2) the differences between the claimed invention and the prior art; (3) the level of ordinary skill in the art; and (4) any relevant secondary considerations, including commercial success, long felt but unsolved needs, and failure of others. *KSR Int'l Co. v. Teleflex Inc.*, No. 04-1350, slip op. at 2 (U.S. April 30, 2007); *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966). "To facilitate review, this analysis should be made explicit." *KSR*, slip op. at 14 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)). That is, the Office Action must make explicit an analysis of the factual inquiries set forth in *Graham*.

In particular in this case, the Examiner has not ascertained the differences between the prior art and the claims in issue. In the Office Action, the Examiner has only identified elements in Applicants' claims not found in one reference and then attempted to find a similar element in another to support an obviousness rejection. Such analysis is improper and incomplete. "Ascertaining the differences between the prior art and the claims at issue requires interpreting the claim language, and considering both the invention and the prior art references as a whole." MPEP §2141.02. Furthermore, "[i]n determining the differences between the prior art and the claims, the question under 35 U.S.C. 103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious." *Id.*, citing *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530 (Fed. Cir. 1983). The Office Action in the present case sets forth a deficient basis for an obviousness rejection because the Examiner has only identified differences between certain elements of Applicants' claims and the references. This analysis is improper and incomplete because the Examiner has not determined whether the Applicants' claims as a whole would have been obvious in view of the combinations of references cited and why the claims as a whole would have been obvious over the references. As a practical matter, the Examiner in this case has made no substantive mention whatsoever of the factual inquiries required by *Graham*. As such, the rejections of claim 1 under 35 U.S.C. § 103 are improper and should be withdrawn.

Conclusion

Claim 1 stands rejected under 35 U.S.C. § 103 as being unpatentable over Zwiegincew in view of Brady. For the reasons set forth above, however, the proposed combination of Zwiegincew and Brady does not render Applicants' claim obvious under 35 U.S.C. § 103. Applicants, therefore, respectfully request that the rejections be withdrawn and the claim be allowed.

Claim 1 stands rejected under 35 U.S.C. § 103 as being unpatentable over Desai in view of Burr and further in view of Delhoune. For the reasons set forth above, however, the proposed combination of Desai, Burr, and Delhoune does not render Applicants' claim obvious under 35 U.S.C. § 103. Applicants, therefore, respectfully request that the rejections be withdrawn the claim be allowed.

The Commissioner is hereby authorized to charge or credit Deposit Account No. 50-0563 for any fees required or overpaid.

Date: June 3, 2008

By:

Respectfully submitted,



H. Artoush Ohanian

Reg. No. 46,022

Biggers & Ohanian, LLP

P.O. Box 1469

Austin, Texas 78767-1469

Tel. (512) 472-9881

Fax (512) 472-9887

ATTORNEY FOR APPLICANTS